> Math 211 : MAPLE Homework Solution #4 -- *Your NAME*

Problem 6(a) : Factoring using the Maple commands ifactor and ifactors

```
> ifactor(123456789);
```

$$(3)^2\,(3803)\,(3607) \tag{1}$$

```
> ifactors(123456789);
```

$$[1, [[3, 2], [3803, 1], [3607, 1]]] \tag{2}$$

Both commands give the same information but in different formats. The answer in both cases is that the prime factors of n = 123456789 are 3, 3803 and 3607 with respective multiplicities 2, 1, 1. Furthermore, the fact that n > 0 is indicated in the second case by the first entry "1" in the list, and in the first case by the absence of a - sign.

Problem 6(b) : A program which returns the list of the first n primes

```
> firstprimes := proc(n) local k;
    return([seq(ithprime(k), k=1..n)]); end;
```

$$firstprimes := \mathbf{proc}(n)\ \mathbf{local}\ k;\ \mathbf{return}\ [seq(ithprime(k), k=1..n)]\ \mathbf{end\ proc} \tag{3}$$

Note: The statement "[seq(ithprime(k), k=1..n)]" by itself does not constitute a program.
You have to use either the function or procedure construction.
The above program used the procedure construction. The following uses the function construction.
(In some Maple versions, this generates a warning message because the variable k was not declared as a local variable.)

```
> firstprimes := n→ [seq(ithprime(k), k=1..n)];
Warning, (in firstprimes) `k` is implicitly declared local
```

$$firstprimes := n \mapsto [seq(ithprime(k), k=1..n)] \tag{4}$$

To find the first 20 and first 50 primes, we evaluate the program firstprimes:

```
> firstprimes(20);
```

$$[2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71] \tag{5}$$

```
> firstprimes(50);
```

$$[2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199, 211, 223, 227, 229] \tag{6}$$

```
>
```